

Appln. No. 10/657,403

Amendment dated August 22, 2006

Reply to Office Action of August 1, 2006

Remarks/Arguments

This Amendment is responsive to the Office Action mailed August 1, 2006.

In the Office Action of August 1, 2006, the Examiner allowed claims 1-6, and rejected claims 7-12. More particularly, the Examiner rejected claims 7-9 and 11 under 35 U.S.C. §102(e), as being allegedly "anticipated" by Townsend *et al.* (US 6,782,160 B2), the Examiner saying:

"Townsend reference disclose an optical device with limitations set forth in the claims, including: a reversion prism having opposite end faces intersected by an axis (Fig. 6; better shown in Fig. 2, wherein the 'axis' is indicated by a dotted line); each of said end faces being disposed at a nonorthogonal angle relative to said axis (Fig. 6); and interface optical elements ('74' Fig. 6) having mating surfaces engaging said end faces ('52' Fig. 6), each of said interface optical elements having an optically-flat surface that is orthogonal to said axis (the surface abutting the terminal elements 62's);

wherein said reversion prism has an index of refraction that is greater than an index of refraction of said interface optical elements (col. 6, ll. 3-14);

wherein said reversion prism is a trapezoidal prism (Fig. 6; see also Fig. 2);

further comprising a housing defining an internal cavity ('54' Fig. 6); in which said reversion prism and said internal optical elements are disposed, wherein said internal cavity is adapted to be at least partially filled with a fluid, and wherein the optically-flat surface of each interface optical element is exposed to said fluid (since the interface optical element IS fluid, this limitation is also inherently met)."

Claims 10 and 12 were rejected under 35 U.S.C. §103(a) for alleged "obviousness" over Townsend *et al.* Here, the Examiner said:

"Claims 10, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend *et al.* (US 6,782,160 B2).

Townsend reference discloses an optical device with nearly all limitations set forth in the claims, except it does not explicitly teach that the interface optical element may be a prism, instead of fluid as disclosed.

However, the use of a triangular prism is well known and common in the optical rotary joint art. The use of a solid prism instead of fluid as disclosed in Townsend would have been considered advantageous and desirable to one of ordinary skill in the art at the

Appln. No. 10/657,403

Amendment dated August 22, 2006

Reply to Office Action of August 1, 2006

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time the invention was made because solid prisms do not require liquid-tight and well sealed housing, as is required for Townsend's liquid interface optical element. Such arrangement would lower the overall cost of device manufacturing. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Townsend to have a solid prism instead of liquid interface optical elements."

From the foregoing statements, it is believed clear that the Examiner regarded the "interface optical elements" in claim 7 as being readable on the fluid-filled interior space 74 of a rotatable housing in Fig. 6 of Townsend *et al.*:

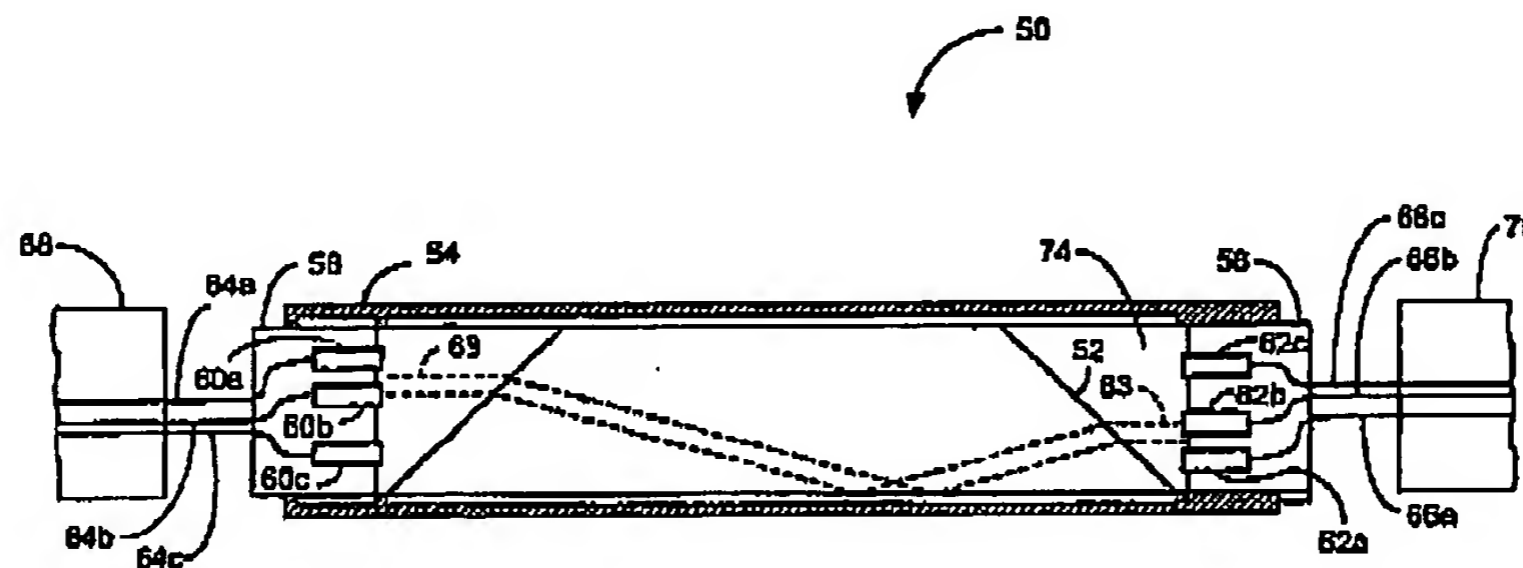


FIG. 6

This embodiment specifically includes a dove prism 52 that is operatively arranged within a cylindrical housing 54. Elements 74 at either end of the dove prism are not prisms at all. Rather, they refer to interior spaces of the housing that can be filled with a transparent fluid. This is made clear from the following passage in Townsend *et al.*:

"Referring again to FIG. 6, one can make the coupler 50 suitable for use in harsh environments and high-precision applications. To make the coupler 50 suitable for high pressures, one can fill the interior 74 of the housing 54 with a transparent liquid and use O-rings (not shown) to form a fluid-tight seal between the connectors 56 and 58 and the housing. For example, one can form the prism 52 out of zinc selenide or chalcogenide glass and use mineral oil for the transparent liquid and to increase the precision at which the coupler 50 rotates the prism 52 to maintain optical alignment, one can construct the rotation assembly (not shown) using ceramic-sleeve technology."

Appln. No. 10/657,403
Amendment dated August 22, 2006
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(US 6,782,160 B2, col. 6, lines 3-14).

From the foregoing, it is clear that the Examiner understands that reference numeral 74 in Townsend *et al.* is simply a fluid, such as mineral oil, in a space and that contacts one of the nonorthogonal faces of the dove prism 52.

The Examiner made the recent Office Action "final", which limits Applicants' options in responding. Under 37 C.F.R. §1.116, an amendment after final rejection may be made cancelling claims, or complying with an requirement of form set forth a previous Office Action. An amendment presenting rejected claims in better form for consideration on appeal may also be admitted. Moreover, an amendment touching the merits of an application may be admitting upon a showing of good and sufficient reasons why the amendment is necessary and was not earlier presented. Indeed, M.P.E.P. § 714.12 states that "[a]ny amendment . . . [after final rejection] . . . that will place the application either in condition for allowance or in better form for appeal may be entered".

In reviewing the Examiner's Action, the newly-cited reference, and the Examiner's construction of the rejected claims, it occurred to Applicant's attorney that claim 7 might be readily amended along the lines of claim 1 so as clearly and unequivocally clarify the point of patentable distinction between the "reversion prism assembly" of claim 7 as compared with the prior art. As the Examiner is well aware, the Townsend *et al.* reference is newly cited. Applicants were unaware of this patent until receipt of the recent Office Action. Moreover, Applicants' attorney was unaware of the Townsend *et al.* reference, and the Examiner's construction of claim 7 insofar as he would contend that the "interface optical elements" in claim 7 might arguably be readable upon a fluid-filled chamber 74 of Townsend *et al.* While Applicants' attorney questions whether this can be done properly, it appears that claim 7 could be amended so as to bring out additional structure that would clearly and unequivocally distinguish from Townsend *et al.*

More particularly, Applicants have amended claim 7 to specify that the claimed reversion prism assembly is "adapted to be at least partially submerged in a fluid having a variable index of refraction". This preamble language parallels the language used in claim 1, which specifies the inclusion of a housing having an internal cavity that was "adapted to be at least partially filled with fluid having a variable index of refraction". Moreover, Applicants have further amended claim 7 to specify that "each interface optical element is so configured and arranged as to permit optical signals to be transmitted along said axis without being refracted by the variable index of refraction of said fluid". This closely parallels the comparable language in claim 1. In fact, as amended herein, claim 1 is directed to a *combination*, and claim 7 is directed to a *subcombination*. This is made clear from the side-by-side comparison of these two claims, as shown below:

"Claim 1 (previously presented): A fiber optic rotary joint, comprising: a housing defining an internal cavity adapted to be at least partially filled with a fluid	"Claim 7 (currently amended): A reversion prism assembly <u>adapted to be at least partially submerged in a</u>
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Appln. No. 10/657,403

Amendment dated August 22, 2006

Reply to Office Action of August 1, 2006

having a variable index of refraction;

first and second optical collimation arrays disposed on opposite sides of said internal cavity for transmitting optical signals therethrough parallel to an axis;

a reversion prism disposed within the internal cavity between said first and second optical collimation arrays, said reversion prism having opposite end faces intersected by said axis; and

interface optical elements having mating surfaces engaging said end faces, each interface optical element including an optically-flat surface facing into said chamber and arranged in a plane perpendicular to said axis;

each interface optical element being so configured and arranged as to permit optical signals to be transmitted along said axis without being refracted by the variable index of refraction of said fluid."

fluid having a variable index of refraction, comprising:

a reversion prism having opposite end faces intersected by an axis, each of said end faces being disposed at a nonorthogonal angle relative to said axis; and

interface optical elements having mating surfaces engaging said end faces, each of said interface optical elements having an optically-flat surface that is orthogonal to said axis;

each interface optical element being so configured and arranged as to permit optical signals to be transmitted along said axis without being refracted by the variable index of refraction of said fluid."

Thus, claim 7, as amended herein, distinguishes patentably from the teaching of the prior art, including the newly-cited Townsend *et al.* reference, in the same manner as claim 1. Claims 8-12 are severally dependent, either directly or indirectly, on independent claim 7, and must similarly so distinguish. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) ["Dependent claims are non-obvious if the independent claims from which the depend are non-obvious."]; *Ex parte Leavell*, 212 USPQ 762 (Bd. App. 1979) ["... where a dependent claim is based on an allowed parent claim, ..., such should have been considered allowable by the examiner for the same reasons as the parent claim"].

Applicants respectfully request that the Examiner consider and enter this Amendment. Applicants and Applicants' attorney were previously unaware of the Townsend *et al.* reference, and only first learned of it upon receipt of the recent Office Action. Applicants have not had an opportunity to respond to this reference, nor to the Examiner's construction of it, nor to the Examiner's construction of claim 7 insofar as he regarded the "interface optical elements" as being satisfied by mineral oil in space 74 of Townsend *et al.* Moreover, the amendment to claim 7 herein closely parallels the language of independent claim 1, and does not require a new search.

Accordingly, claims 1-12, as amended herein by the clarifying changes made in this Amendment, are believed to distinguish patentably from the prior art.

This amendment is believed to be fully responsive to the Office Action of August 1, 2006; is believed to squarely address each and every ground for objection or rejection raised by the Exam-

Appln. No. 10/657,403
Amendment dated August 22, 2006
Reply to Office Action of August 1, 2006

iner, and is further believed to materially advance the prosecution of this application toward immediate allowance. No additional fee is believed to be due. However, if any such additional fee is found to be due and deficient, kindly change the same to our Deposit Account No. 19-3320.

Accordingly, formal allowance of claims 1-12, as amended herein, is courteously solicited.

Respectfully submitted,

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Signed: August 22, 2006